

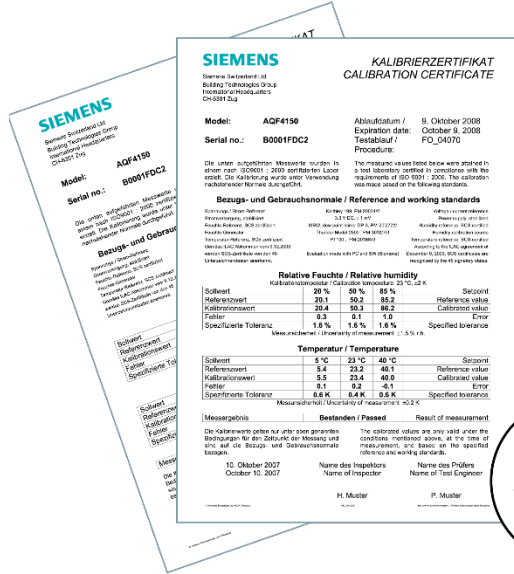
DCC Information Models based on Webservice Standards and Standardized Semantics

October 10, 2024; QI-Digital-Forum

Christian Block, ECLASS Head Office
Sebastian Käbisch, SIEMENS

Calibration Certificates (CC)

Typical today's Usage and IT's Challenges




- Provided in paper form
- Hard to compare multiple calibration results
- Missing or manual integration of latest DCC information into, e.g., industry processes
- Risk of material waste if there is no knowledge of, e.g., acceptable tolerance values

Source: <https://hit.sbt.siemens.com/RWD/app.aspx?RC=HQEU&lang=de&MODULE=Catalog&ACTION=ShowProduct&KEY=BPZ%3aAQP4150>



*How can we digitalize CC?
Reuse of new significant industry standards*

 **CLASS**

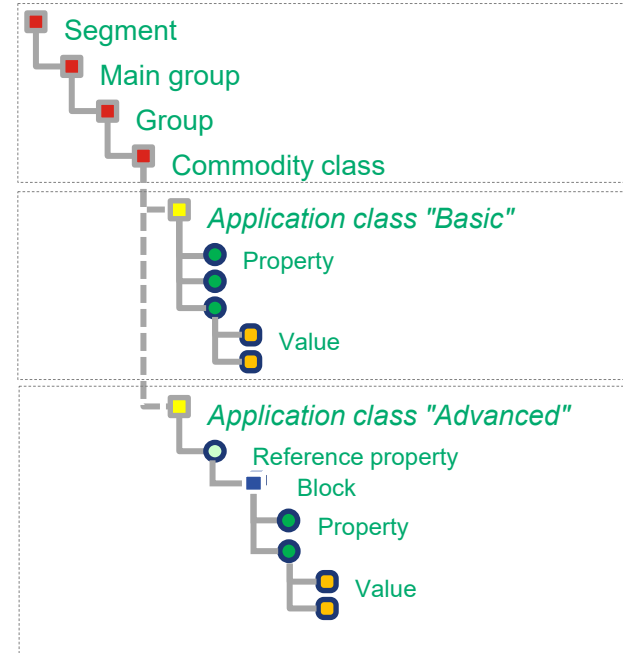
WEB OF

THINGS

0 ●
1 ● 0 ●
AAS



ECLASS

- ECLASS is a hierarchical standard for master data to classify and describe products and services
 - Classification tree over four levels
 - Properties at 4th level added
 - Values, Units & Data types added to properties
- Semantic interoperability
- Not an exchange format
- ECLASS is used in exchange formats:
BMEcat, AutomationML, Asset Administration Shell, etc.



based on slides from Class.Ing.

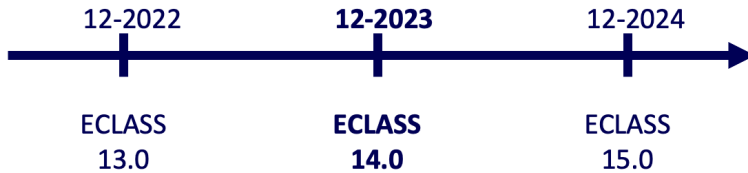


ECLASS

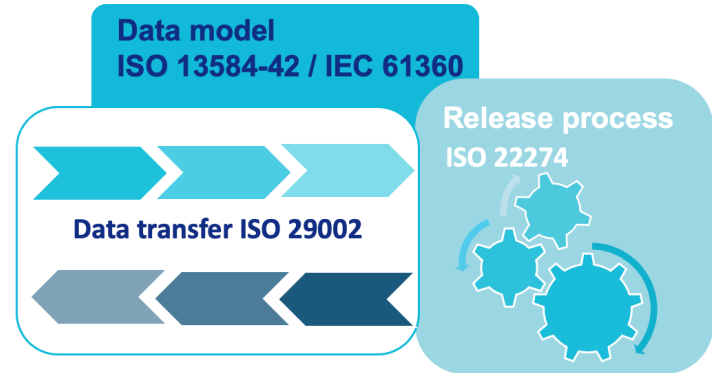


ECLASS

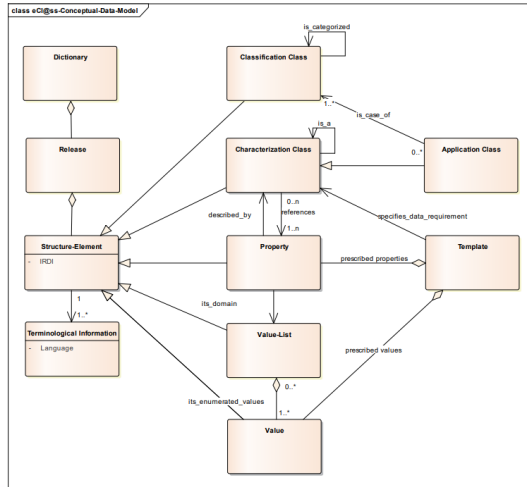
- Constant updates & permanent improvements



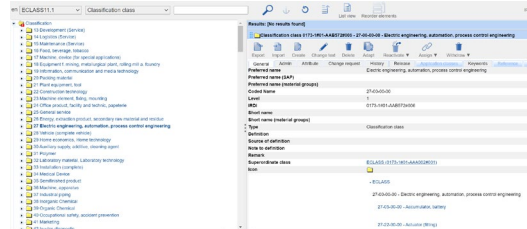
- ISO/IEC based data model



Conceptual data model



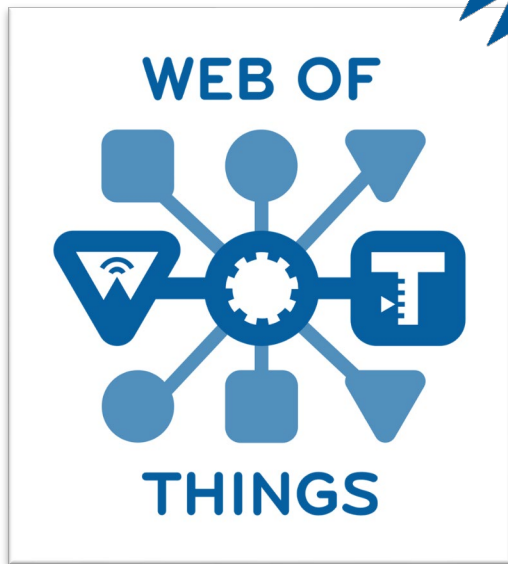
ECLASS CDP – Content Development Platform



ECLASS Deliverables

- Dictionary and Mapping/Update Files
- CSV
- XML
 - OntoML (ISO 13584–32)
 - UnitsML
- JSON
 - ECLASS Webservice
- RDF

WEB OF THINGS



W3C®

- IT-Friendly technologies, reuse established Web standards
- Protocols agnostics
- Adapts to any application domain
- Local, Edge, Cloud
- Key technology: Standardized *Device Description Language* called **WoT Thing Description**
- Publiised WoT 1.0 Recommendations in 2020; WoT 1.1 in 2024
- Currently working on WoT 2.0

<https://www.w3.org/WoT/>



WOT THING DESCRIPTION STANDARDIZED DEVICE INTERFACE DESCRIPTIONS

```

1 {
2   "@context": "https://www.w3.org/2022/wot/td/v1.1",
3   "title": "Siemens SENTRON PAC4200",
4   "base": "modbus-tcp://192.168.10.100:502/1/",
5   "description": "The SENTRON PAC4200 is a measuring device f
6   "support": "https://support.industry.siemens.com/dl/dl-medi
7   "securityDefinitions": {
8     "nosec_sc": {
9       "scheme": "nosec"
10    }
11  },
12  "security": "nosec_sc",
13  "properties": {
14    "voltage_l1_n": {
15      "title": "Voltage L1-N",
16      "type": "number",
17      "unit": "V",
18      "forms": [
19        {
20          "href": "40001?quantity=2",
21          "contentType": "application/octet-stream",
22          "modv: function": "readHoldingRegisters",
23          "modv: type": "xsd:float",
24          "modv: mostSignificantByte": true,
25          "modv: mostSignificantWord": true,
26        }
27      ]
28    },
29    "voltage_l2_n": {
30      "title": "Voltage L2-N",
31      "type": "number",
32      "unit": "V",
33      "forms": [
34        {
35          "href": "40003?quantity=2",
36          "contentType": "application/octet-stream",

```



Web of Things (WoT) Thing Description

W3C Recommendation 9 April 2020 (Link errors corrected 23 June 2020)



This version:

<https://www.w3.org/TR/2020/REC-wot-thing-description-20200409/>

Latest published version:

<https://www.w3.org/TR/wot-thing-description/>

Latest editor's draft:

<https://w3c.github.io/wot-thing-description/>

Implementation report:

<https://w3c.github.io/wot-thing-description/testing/report.html>

Previous version:

<https://www.w3.org/TR/2020/PR-wot-thing-description-20200130/>

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Participate:

[GitHub: w3c/wot-thing-description](https://github.com/w3c/wot-thing-description)
[File a bug](#)
[Commit history](#)
[Pull requests](#)

Contributors:

[in the GitHub repository](#)

Repository:

[We are on GitHub](#)
[File a bug](#)

Please check the [errata](#) for any errors or issues reported since publication.

See also [translations](#).

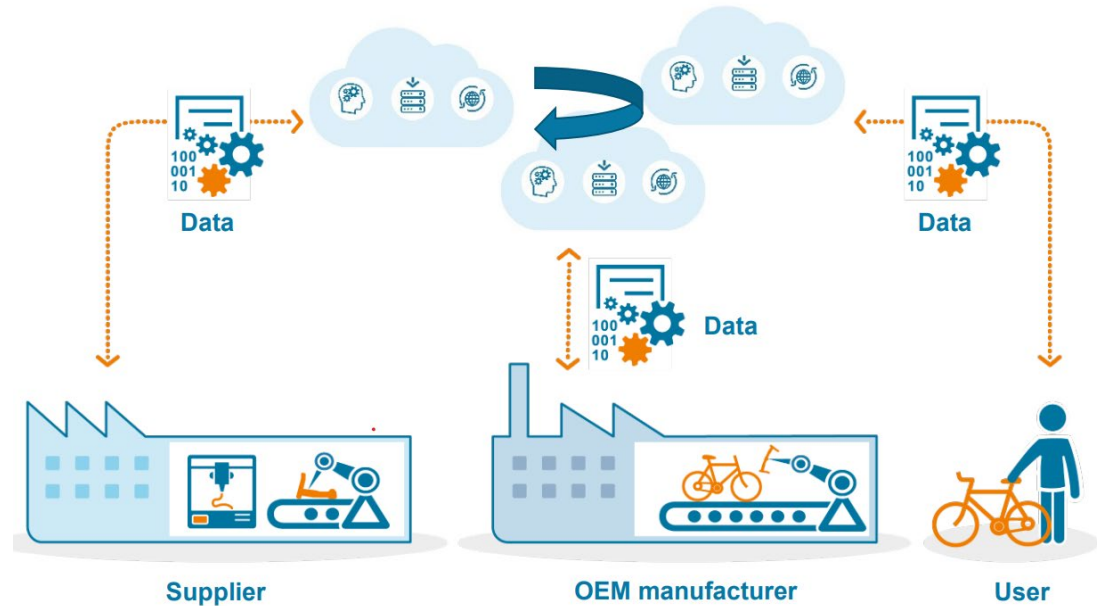
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Abstract

BASIC AAS

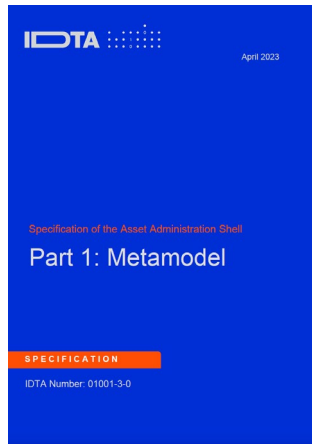
- Aim: seamless exchange of information between partners along the value chain
- Asset Administration Shell (AAS) is keystone to achieve that goal



Source: Plattform Industrie 4.0



AAS AND ITS DISTRIBUTION OPTIONS



Source: <https://industrialdigitaltwin.org/content-hub/downloads>

+ currently specified in IEC 63278



Can be serialized as XML or JSON and can be organized as an AASX file

```

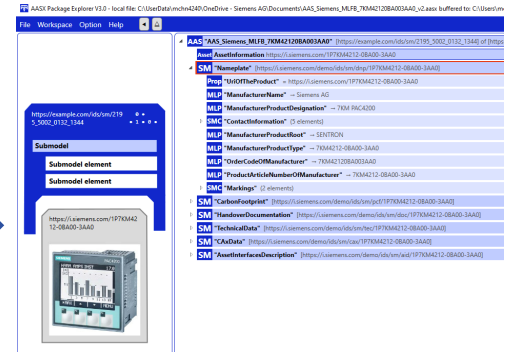
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              "index": 0,
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        },
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              "index": 0,
              "idtype": "IRI"
            }
          ]
        },
        {
          "keys": [
            ...
          ]
        }
      ]
    }
  ]
}

```

As file

Via interface

Typically, AAS is explored / edit by AAS tools (e.g., AASX Explorer)



AAS IS ORGANIZED BY ITS SUBMODELS

Registered AAS Submodel Templates

You would like to develop your own submodel templates or collaborate in the development of the listed submodel templates? Find the process described [here](#). For further questions, contact us via [email](#).

Number of our submodels: **89**

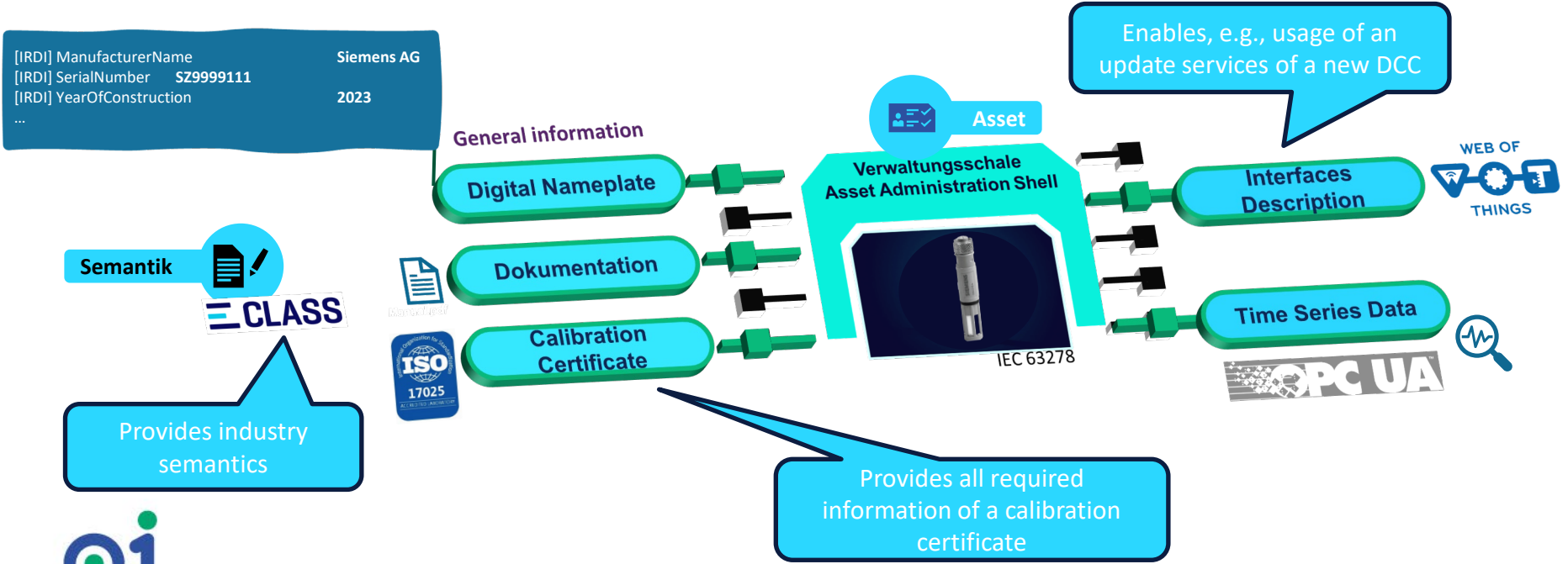
Submodel Template	IDTA Number	Version	Status	Downloads & Links
Inclusion of Module Type Package (MTP) Data into Asset Administration Shell	02001	1.0	Published	Download → GitHub →
Contact Information	02002	1.0	Published	Download → GitHub →
Generic Frame for Technical Data for Industrial Equipment in Manufacturing	02003	1.2	In Development	Download → GitHub →

<https://industrialdigitaltwin.org/en/content-hub/submodels>

- Analogy: Shelf (~AAS) and folders (~submodels)
- IDTA maintain a submodel registry and has working groups for new submodel specifications
- Submodels are based on existing standards (z.B. ECLASS, OPC UA, W3C WoT, ...).



HOW AN INTERACTIVE DCC CAN LOOK LIKE



COME ON BOARD AND MAKE DCC A REALITY

- IDTA started a new Working Group **Digital Quality Document**
- The submodel template will covers also **Digital Calibration Certificates**
- It is based on a pre-version from the InterOpera project
- Please contact [Sudip Adhikari](#) (IDTA) or [Sascha Eichstädt](#) (PTB)



SPECIFICATION
Submodel Digital Quality Documents.

Version 1.0

07-08-2023

Submodel Template of the
Asset Administration Shell





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